

CM300 competency check list:

1. The user must understand the emergency action: SHUT GUN VALVE. The user must have in writing all emergency contact numbers.

2. Filling up LN2.

- Water emptied prior to filling.
- Safety glasses worn.
- LN2 refilled every 4 hrs.

3. Removing sample holder from column.

- Gloves worn.
- Gun valve checked.
- Holder centered.
- Front panel pressed, pulled holder slow and even.

4. A sample must be loaded into the double tilt holder.

- A description of potential dangers must be given (sample thickness, stability, magnetic materials, contaminating materials).
- Sample properly loaded. (Proper height and snugness)
- The sample should be plasma cleaned (except grid samples with carbon support films).

5. The sample holder must be inserted in the column without microscope shutdown.

- Holder properly aligned and fully inserted.
- Holder type and cable connection confirmed.
- Red light checked before rotation.
- vacuum checked after holder fully inserted.

6. Open Gun valve.

- HT and FEG extracting voltage checked.
- 5 minutes waited after insertion of holder.
- Vacuum checked.
- Rotated the valve knob slow enough without crashing HT.
- beam found.

7. The user must be able to fully tune a moderately misaligned instrument

Beam alignment, rot center, pivot points, 2 fold astigmatism, coma.

- C2 aperture aligned.
- Eucentric height found.
- Gun aligned.
- GIF tuned.
- Sample tilted to a zone axis.
- Minimum contrast found

- pivot points aligned.
- HT rotation center aligned.
- Objective stigmatism corrected.
- Coma free aligned
- A state-of-art Scherzer lattice image must be recorded
- The user must calibrate the image
- A focus series of 20 images must be recorded at Lichte defocus
- The user must measure defocus values from the lattice images
- The user must store his work on a CD
- The user must reconstruct his focus series to produce phase and amplitude images

For bonuses:

- The user demonstrates her/his ability to simulate his crystal structure
- The user records energy filtered images and loss spectra
- The user records dark field TEM images
- The user switches between 150 and 300 kV operation

During qualifying test, the user must demonstrate their ability in exchanging samples by without looking at the notes. Notes are allowed during alignment procedures.

User may fail the test by making one major mistake during step 1-6, or accumulate 3 mistakes during alignments.